National Institute of Standards & Technology

Report of Investigation

Reference Material 8786

Filter Blank for RM 8785

(Quartz-Fiber Filter)

This Reference Material (RM) 8786 is the filter blank for the production of RM 8785 *Air Particulate Matter* (PM) *on Filter Media*. RM 8785 is intended primarily for use in the evaluation of analytical methods used to characterize the carbon composition of atmospheric fine-particulate matter (PM) for national air quality monitoring programs. RM 8785 consists of only the fine fraction (nominally < 2.5 μm aerodynamic diameter) of SRM 1649a *Urban Dust* re-suspended in air and filtered onto quartz-fiber filter. RM 8785 was produced at SRI International by re-suspending SRM 1649a in air and by collecting the aerosol on 320 quartz-fiber filters in each of 7 batches for a total of 2240 filters [1]. A unit of RM 8786 consists of a single production blank filter with a 37 mm diameter.

RM 8786 filter blanks were exposed to the background conditions of the SRI dust generation and collection system used to obtain RM 8785. The SRI system was thoroughly cleaned before the blank run to remove all traces of particulate from earlier runs. Air used for particle re-suspension was treated with an in-line filter having a rated efficiency of 99.99 % for 0.6 μm particles before entering the air compressor. To minimize particulate matter in the SRI system, the compressed air supply was filtered using an ultra high efficiency oil removal filter for coalescing ultra-fine oil aerosols and solid particles to 0.01 μm. Any oil and hydrocarbon vapors were removed using a two stage carbon filtration system of finely divided carbon particles to remove most of the oil vapor and a multiple-layer fiber media bonded with micron carbon particles to remove the remaining oil vapor.

RM 8786 filters are tissue quartz 2500 QAT-UP, Pall Life Sciences®[1] (Ann Arbor, MI) from a single Lot #52973. To remove adsorbed organics, the manufacturer baked the filters at 500 °C. Each RM 8786 quartz-fiber filter blank was housed in an URG-2000®[1] filter pack (Figure 1) that includes an impactor plate to pass only particles nominally less than 2.5 μm aerodynamic diameter. The impactor plate, positioned just beyond the filter pack inlet, was coated with 50 μL of a silicone oil solution prepared from Dow Corning 704®[1] and toluene at a concentration of 10 mg mL^{-1} to minimize particle bounce. The filter was held in place using two Teflon®[1] gaskets that provided a reliable seal and minimized potential losses of filter fibers that would otherwise affect the gravimetric analysis.

The background (blank) run consisted of 320 unweighed quartz-fiber filters referred to as process blanks. Each filter blank was uniquely identified by its production characteristics, *i.e.*, batch and chamber position (12959-28 and *e.g.*, IV-D-5; the latter designates chamber-column-row). The SRI system was operated over a period of 43 min to generate blanks representative of the process without dust present. RM 8786 filter blanks were treated differently only in that they were not subjected to gravimetric analysis. RM 8786 is represented by the filter blanks identified in Table 1.

The production of RM 8786 Filter Blank was coordinated by G.A. Klouda of the NIST Surface and Microanalysis Science Division.

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[1]Certain commercial equipment, instruments, or materials are identified in this certificate to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

The support aspects involved in the issuance of this RM were coordinated through the NIST Standard Reference Materials Program by B.S. MacDonald of the NIST Measurement Services Division.

Expiration of Certification: The certification of this RM is valid **indefinitely**, within the measurement uncertainties specified, provided the SRM is handled and stored in accordance with the instructions given in this certificate. However, the certification is invalid if the SRM is damaged, contaminated, or modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Information Values: A trial background run of the SRI system over a 1 h duration with 2500 QAT-UP quartz-fiber filters showed that the average organic carbon and the standard deviation of the blank was (n = 4), is given below with no elemental carbon detected. This information value is considered to be a value that will be of use to the SRM user, but insufficient information is available to assess the uncertainty associated with the value or only a limited number of analyses were performed.

Average Organic Carbon: $3.3\ \mu g \cdot cm^{-2} \pm 0.3\ \mu g \cdot cm^{-2}$

Although RM 8785 value assignments for total carbon, elemental carbon and organic carbon are not corrected for blank carbon, intercomparison of laboratories and methods involving chemical speciation may warrant blank correction and will find the availability of RM 8786 useful.

Table 1. Filter Blank Identification (Chamber Position) Number Designation by Collection Chamber (I-IV), Column (A-H) and Row (1-10)

I-A-1	I-B-1	I-C-1	I-D-1	I-E-1	I-F-1	I-G-1	I-H-1
I-A-2	I-B-2	I-C-2	I-D-2	I-E-2	I-F-2	I-G-2	I-H-2
I-A-3	I-B-3	I-C-3	I-D-3	I-E-3	I-F-3	I-G-3	I-H-3
I-A-4	I-B-4	I-C-4	I-D-4	I-E-4	I-F-4	I-G-4	I-H-4
I-A-5	I-B-5	I-C-5	I-D-5	I-E-5	I-F-5	I-G-5	I-H-5
I-A-6	I-B-6	I-C-6	I-D-6	I-E-6	I-F-6	I-G-6	I-H-6
I-A-7	I-B-7	I-C-7	I-D-7	I-E-7	I-F-7	I-G-7	I-H-7
I-A-8	I-B-8	I-C-8	I-D-8	I-E-8	I-F-8	I-G-8	I-H-8
I-A-9	I-B-9	I-C-9	I-D-9	I-E-9	I-F-9	I-G-9	I-H-9
I-A-10	I-B-10	I-C-10	I-D-10	I-E-10	I-F-10	I-G-10	I-H-10
II-A-1	II-B-1	II-C-1	II-D-1	II-E-1	II-F-1	II-G-1	II-H-1
II-A-2	II-B-2	II-C-2	II-D-2	II-E-2	II-F-2	II-G-2	II-H-2
II-A-3	II-B-3	II-C-3	II-D-3	II-E-3	II-F-3	II-G-3	II-H-3
II-A-4	II-B-4	II-C-4	II-D-4	II-E-4	II-F-4	II-G-4	II-H-4
II-A-5	II-B-5	II-C-5	II-D-5	II-E-5	II-F-5	II-G-5	II-H-5
II-A-6	II-B-6	II-C-6	II-D-6	II-E-6	II-F-6	II-G-6	II-H-6
II-A-7	II-B-7	II-C-7	II-D-7	II-E-7	II-F-7	II-G-7	II-H-7
II-A-8	II-B-8	II-C-8	II-D-8	II-E-8	II-F-8	II-G-8	II-H-8
II-A-9	II-B-9	II-C-9	II-D-9	II-E-9	II-F-9	II-G-9	II-H-9
II-A-10	II-B-10	II-C-10	II-D-10	II-E-10	II-F-10	II-G-10	II-H-10
III-A-1	III-B-1	III-C-1	III-D-1	III-E-1	III-F-1	III-G-1	III-H-1
III-A-2	III-B-2	III-C-2	III-D-2	III-E-2	III-F-2	III-G-2	III-H-2
III-A-3	III-B-3	III-C-3	III-D-3	III-E-3	III-F-3	III-G-3	III-H-3
III-A-4	III-B-4	III-C-4	III-D-4	III-E-4	III-F-4	III-G-4	III-H-4
III-A-5	III-B-5	III-C-5	III-D-5	III-E-5	III-F-5	III-G-5	III-H-5
III-A-6	III-B-6	III-C-6	III-D-6	III-E-6	III-F-6	III-G-6	III-H-6
III-A-7	III-B-7	III-C-7	III-D-7	III-E-7	III-F-7	III-G-7	III-H-7
III-A-8	III-B-8	III-C-8	III-D-8	III-E-8	III-F-8	III-G-8	III-H-8
III-A-9	III-B-9	III-C-9	III-D-9	III-E-9	III-F-9	III-G-9	III-H-9
III-A-10	III-B-10	III-C-10	III-D-10	III-E-10	III-F-10	III-G-10	III-H-10
IV-A-1	IV-B-1	IV-C-1	IV-D-1	IV-E-1	IV-F-1	IV-G-1	IV-H-1
IV-A-2	IV-B-2	IV-C-2	IV-D-2	IV-E-2	IV-F-2	IV-G-2	IV-H-2
IV-A-3	IV-B-3	IV-C-3	IV-D-3	IV-E-3	IV-F-3	IV-G-3	IV-H-3
IV-A-4	IV-B-4	IV-C-4	IV-D-4	IV-E-4	IV-F-4	IV-G-4	IV-H-4
IV-A-5	IV-B-5	IV-C-5	IV-D-5	IV-E-5	IV-F-5	IV-G-5	IV-H-5
IV-A-6	IV-B-6	IV-C-6	IV-D-6	IV-E-6	IV-F-6	IV-G-6	IV-H-6
IV-A-7	IV-B-7	IV-C-7	IV-D-7	IV-E-7	IV-F-7	IV-G-7	IV-H-7
IV-A-8	IV-B-8	IV-C-8	IV-D-8	IV-E-8	IV-F-8	IV-G-8	IV-H-8
IV-A-9	IV-B-9	IV-C-9	IV-D-9	IV-E-9	IV-F-9	IV-G-9	IV-H-9
IV-A-10	IV-B-10	IV-C-10	IV-D-10	IV-E-10	IV-F-10	IV-G-10	IV-H-10

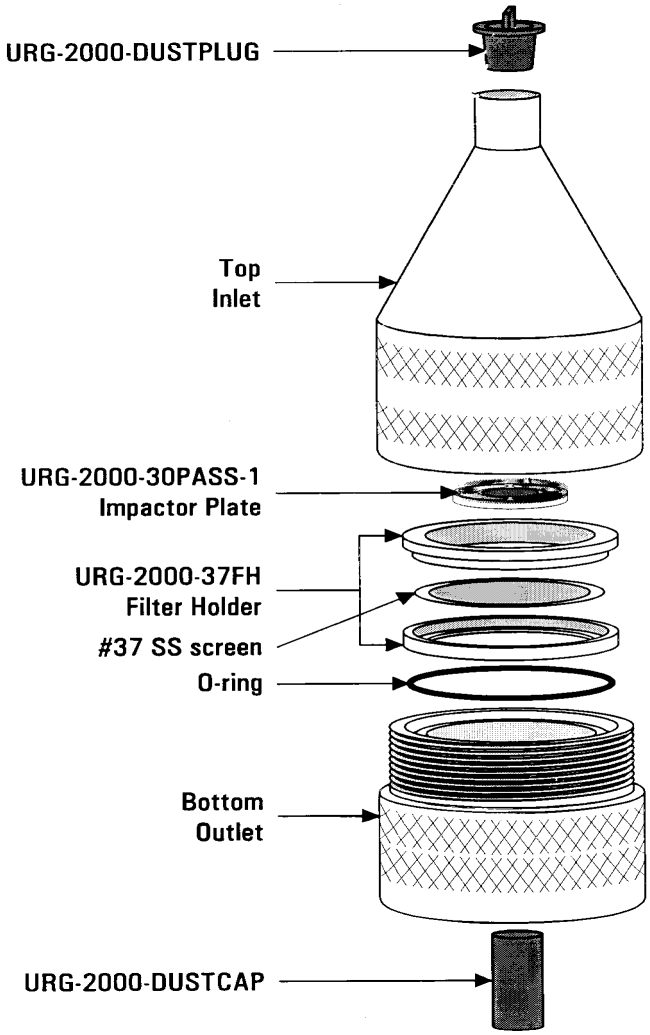

Figure l. URG-2000 Filter Pack

REFERENCE

[1] Klouda, G.A.; Filliben, J.J.; Parish, H.J.; Chow, C.C.; Watson, J.G.; Cary, R.A.; *Reference Material 8785: Air Particulate Matter on Filter Media*; Taylor and Francis Ltd., Aerosol Sci. and Technol., Vol. 39, No. 2, pp. 173–183 (2005).

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